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(56) Documents cited **GB 2069675A** **GB 1011579**
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(71) Applicants **Mortimer Allan Schenker, 17046 Burbank Boulevard Apartment 8, Encino, California 91316, United States of America**
(72) Inventor **Mortimer Allan Schenker**
(74) Agents **E. N. Lewis and Taylor, 144 New Walk, Leicester LE1 7JA**

(54) Refrigerated display case

(57) Energy losses from refrigerated display cases, which are normally open, can be reduced by the use of the shield assembly (10). The shield assembly comprises a plurality of transparent and resilient panels (28), each panel being adjacent to at least one another and having an overlapping relationship with the adjacent panel. The panels are mounted in a rigid frame and allow access therethrough by stretching and bending one or more of the panels along the overlap. The plurality of panels are fitted in a specifically configured mounting means (38) such that they are held in place across an opening of the display case. Retaining means (39) are disposed adjacent the other end of the panels to keep the shield assembly in proper position.

Fig. 1.

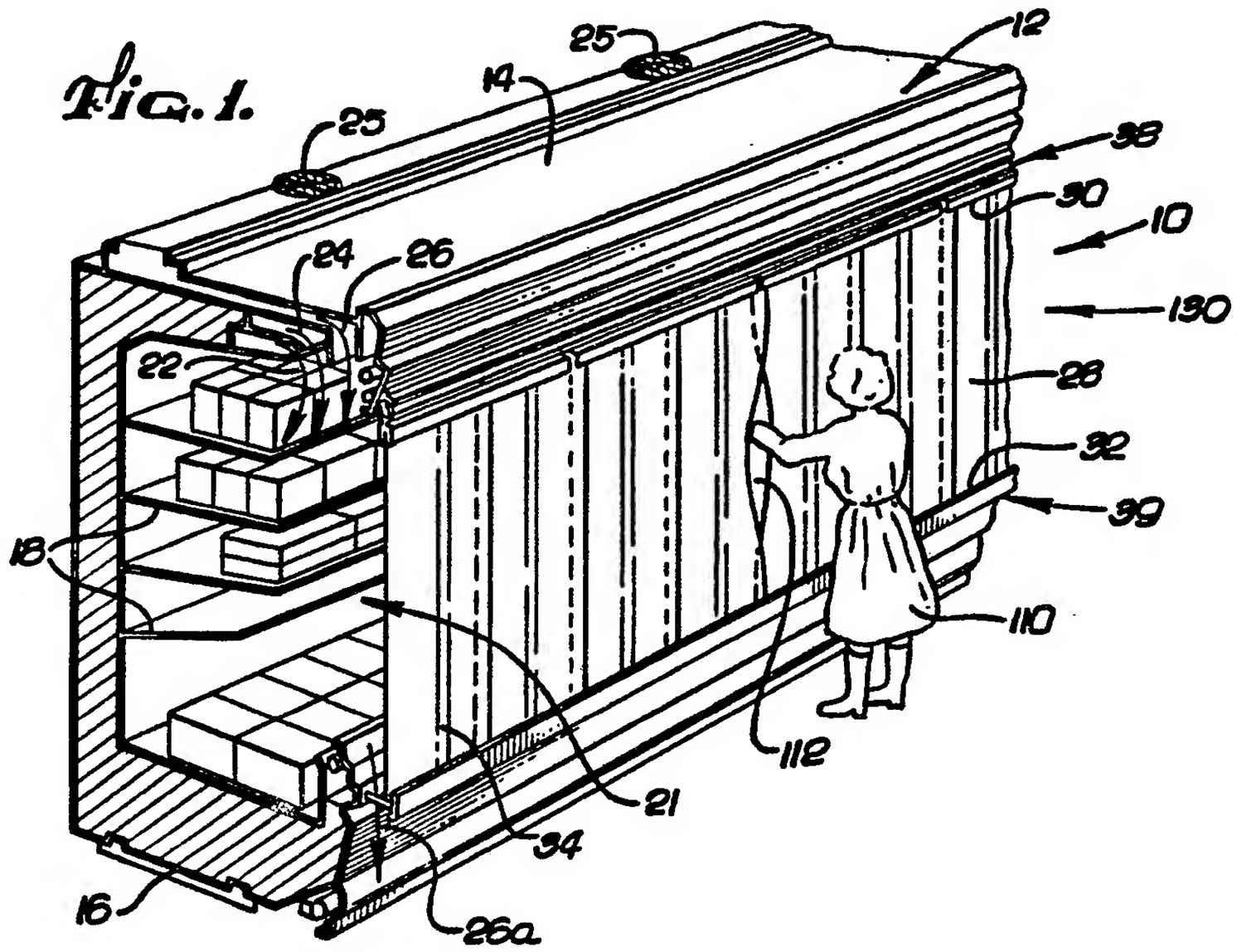

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Fig. 1.

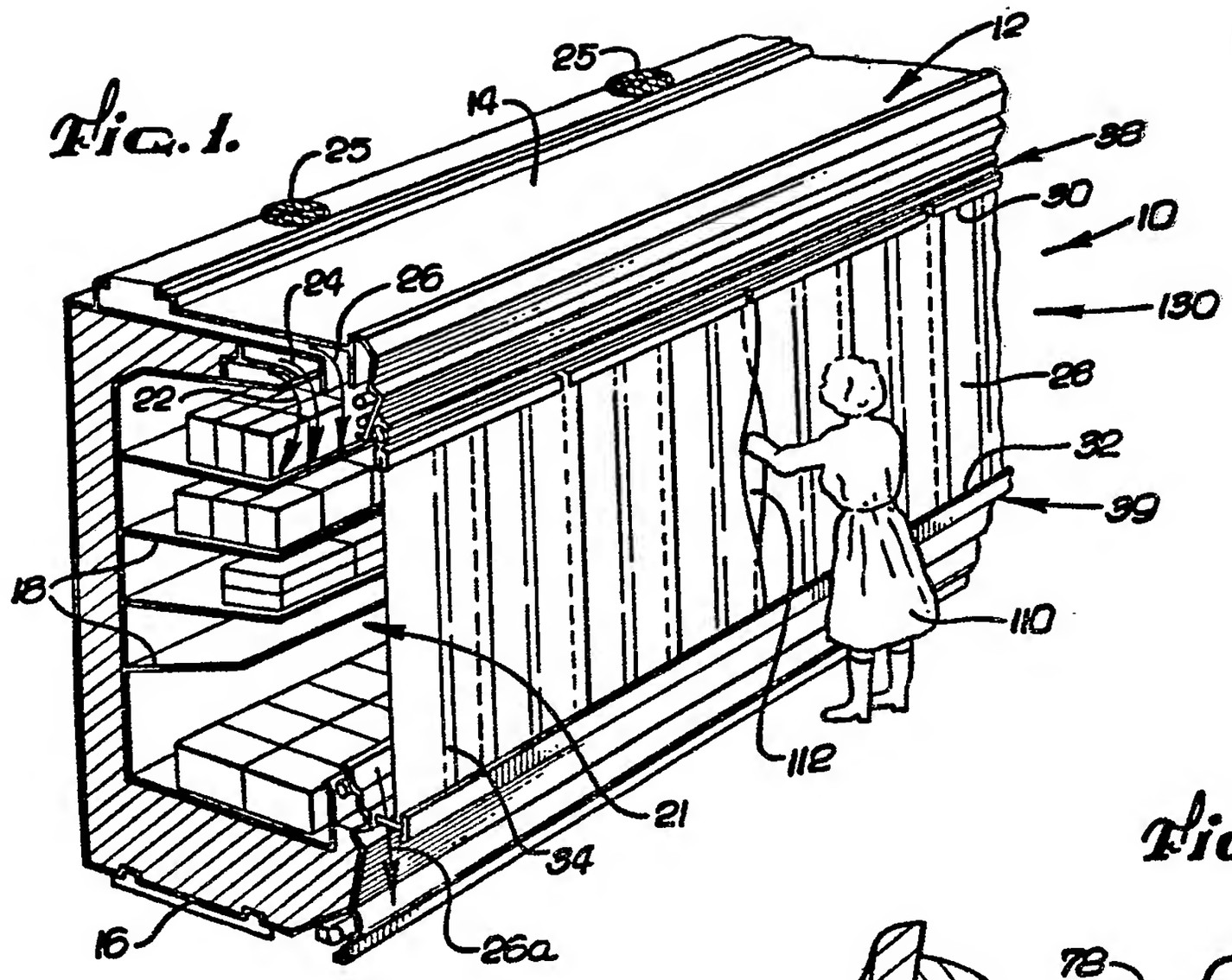


Fig. 3.

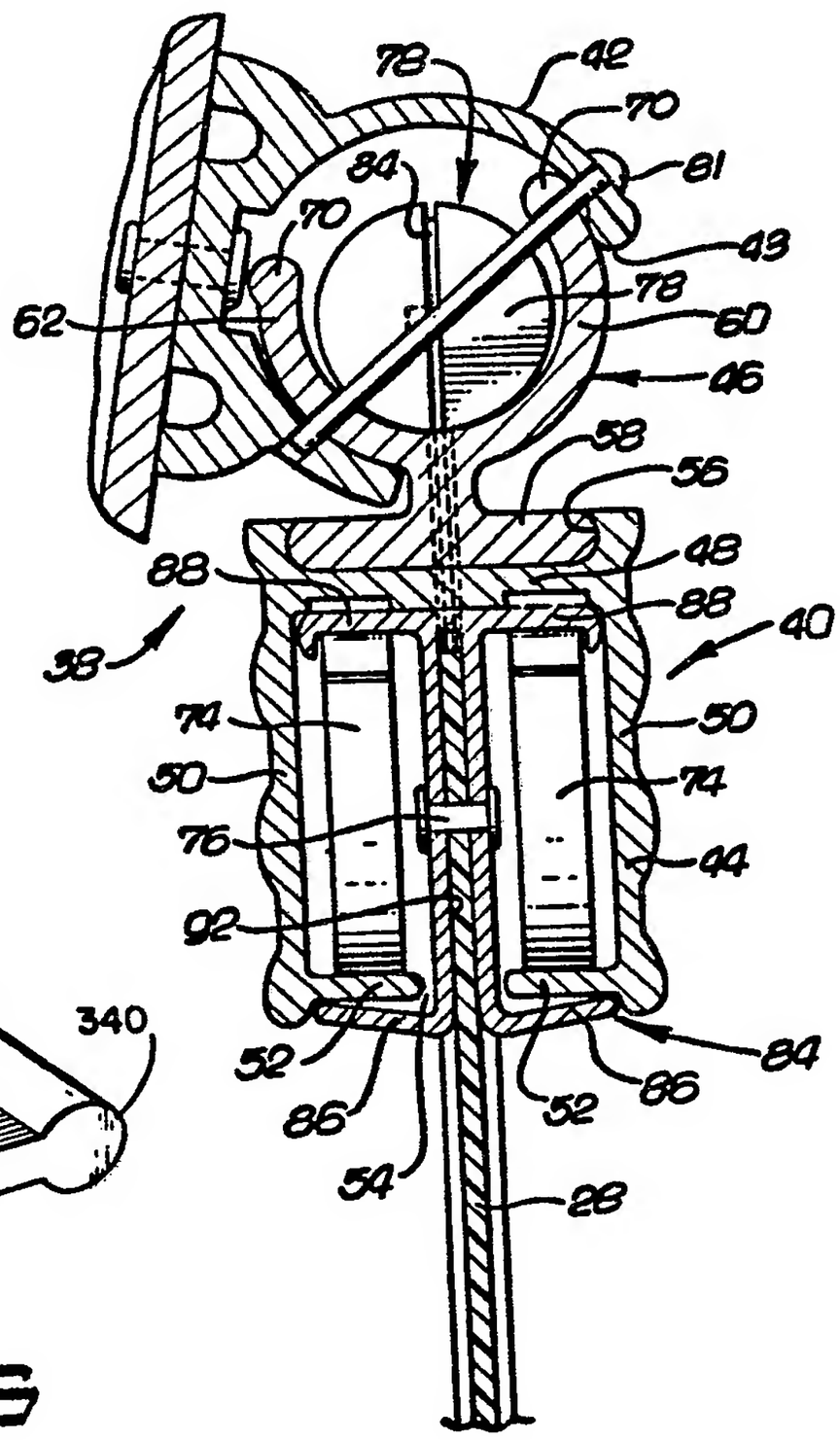
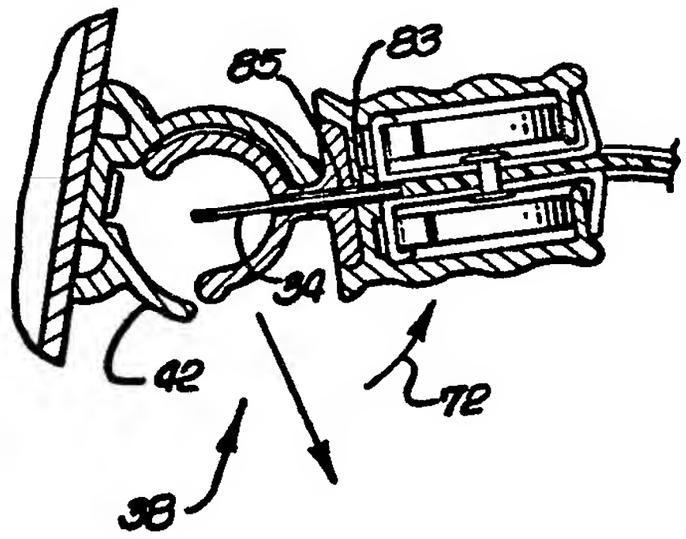


Fig. 4.



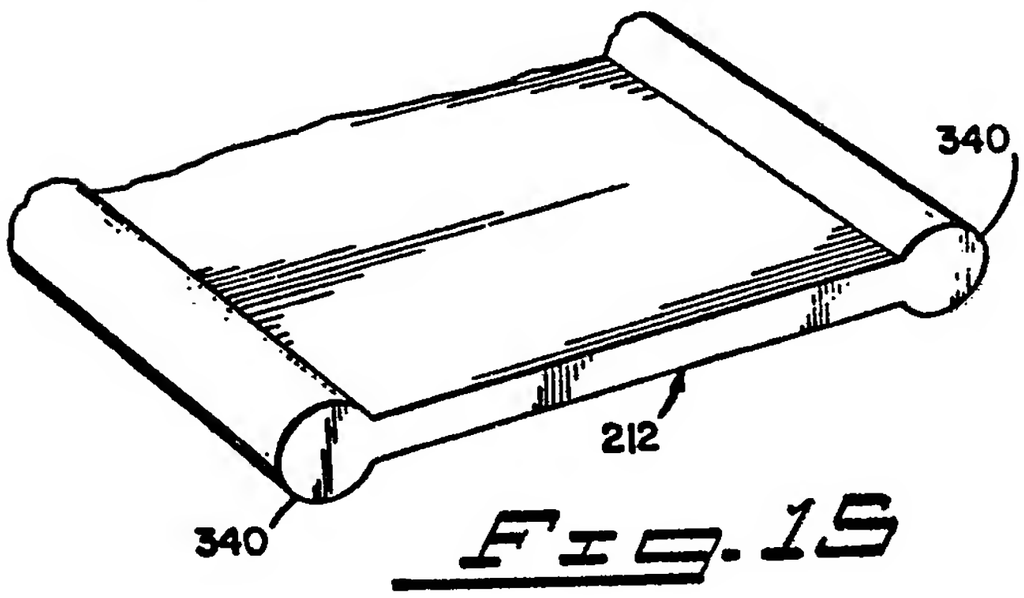


Fig. 15

Fig. 2.

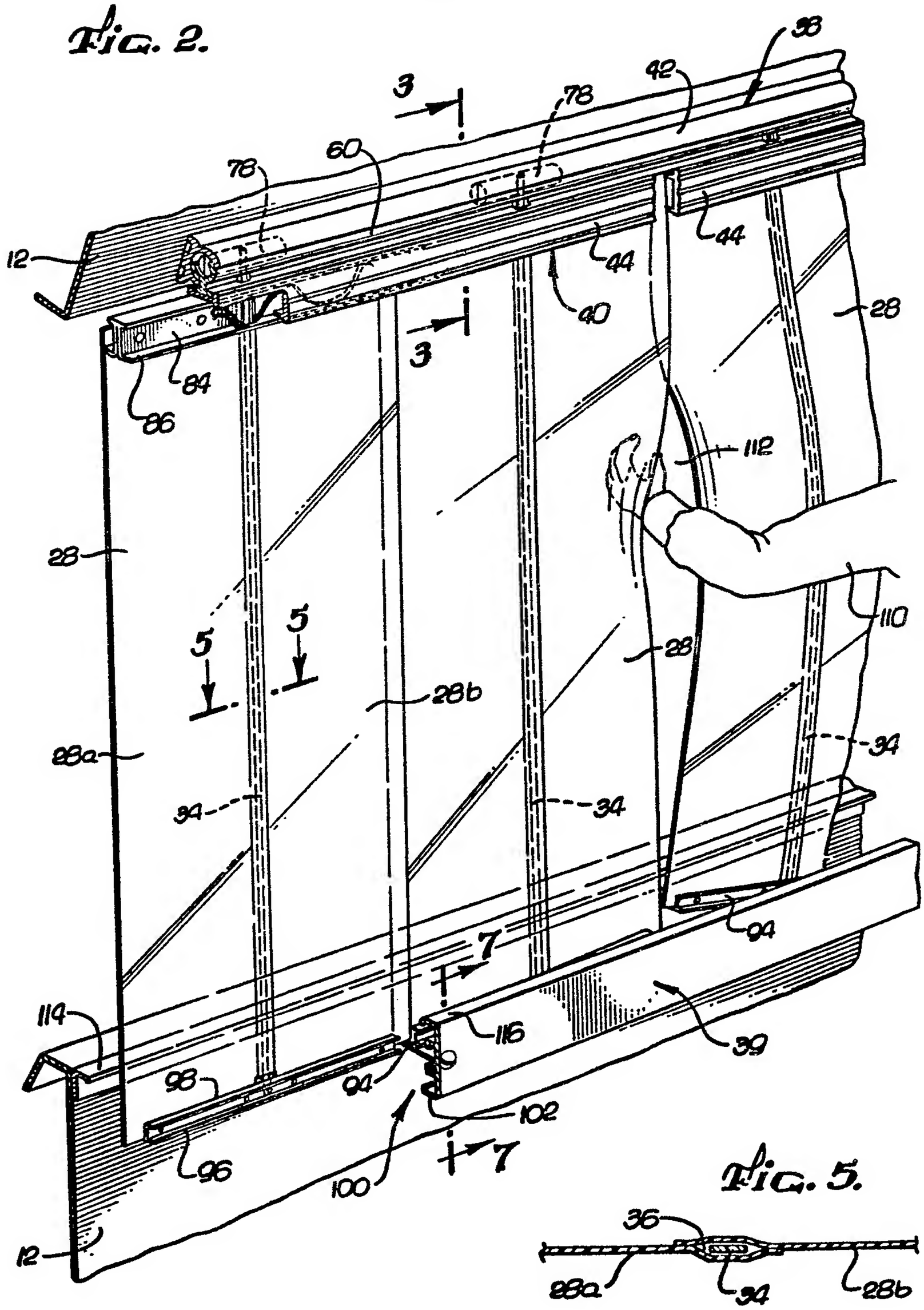

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Fig. 5.

36
28a
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28b

Fig. 6.

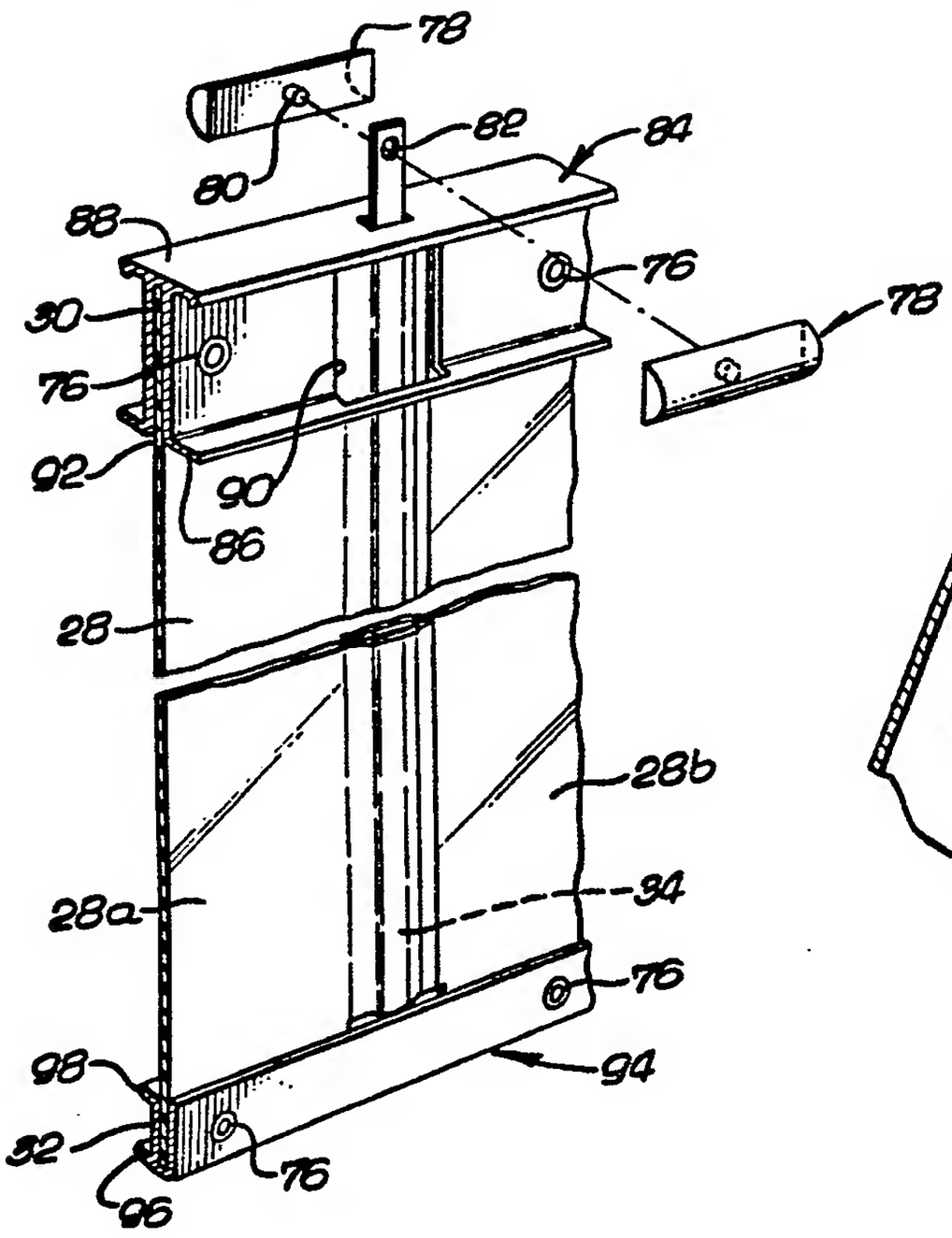

Fig. 7.

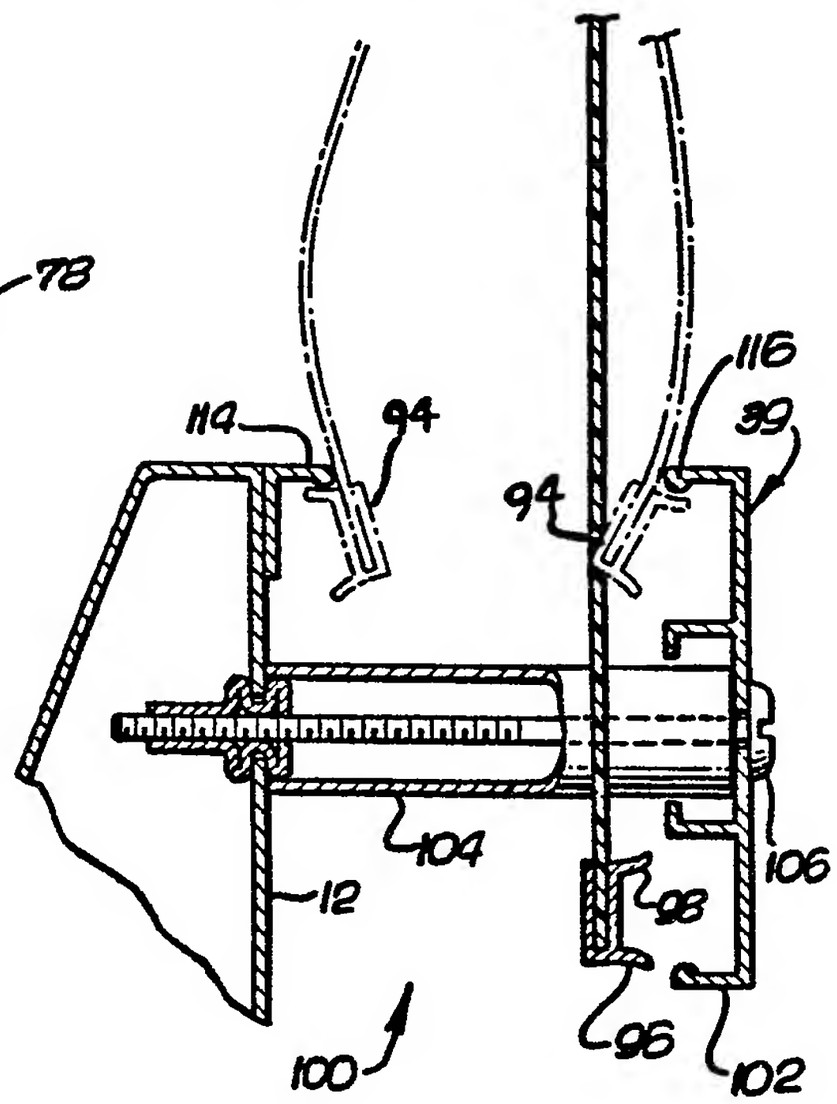

Fig. 9.

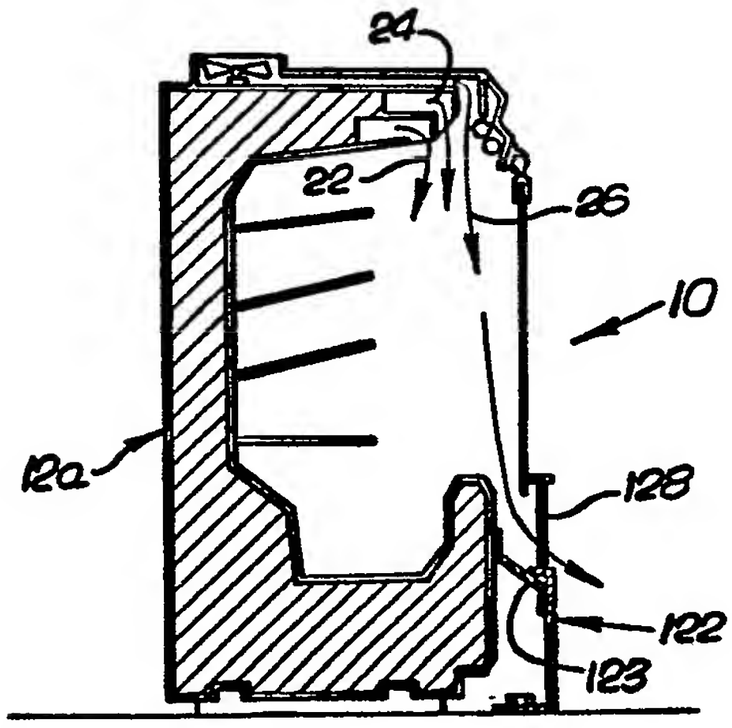

Fig. 8.

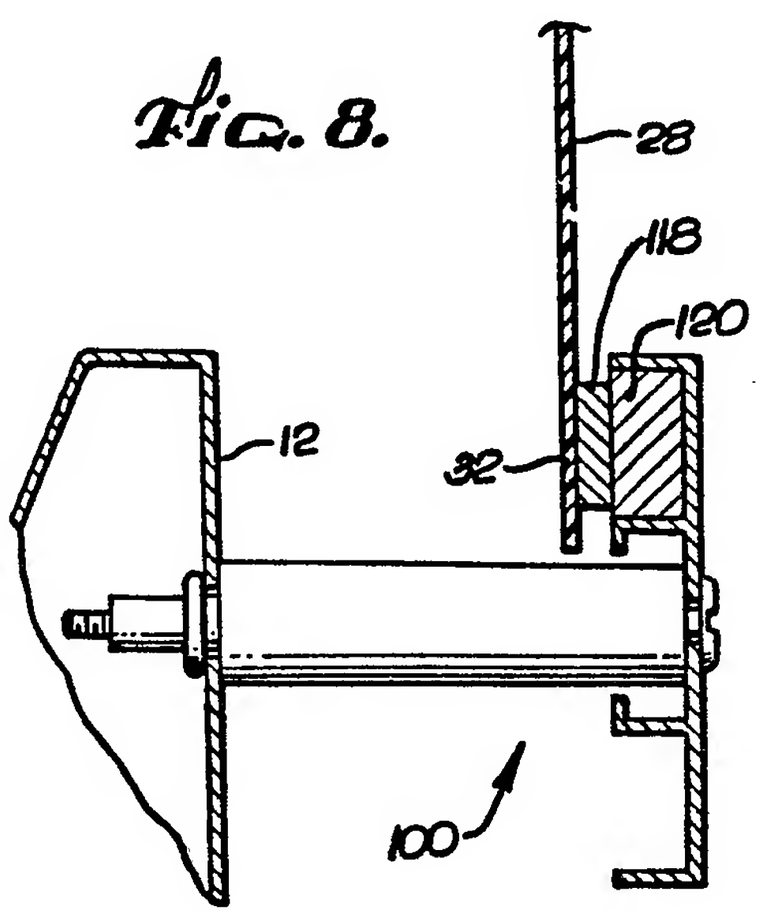

Fig. 10

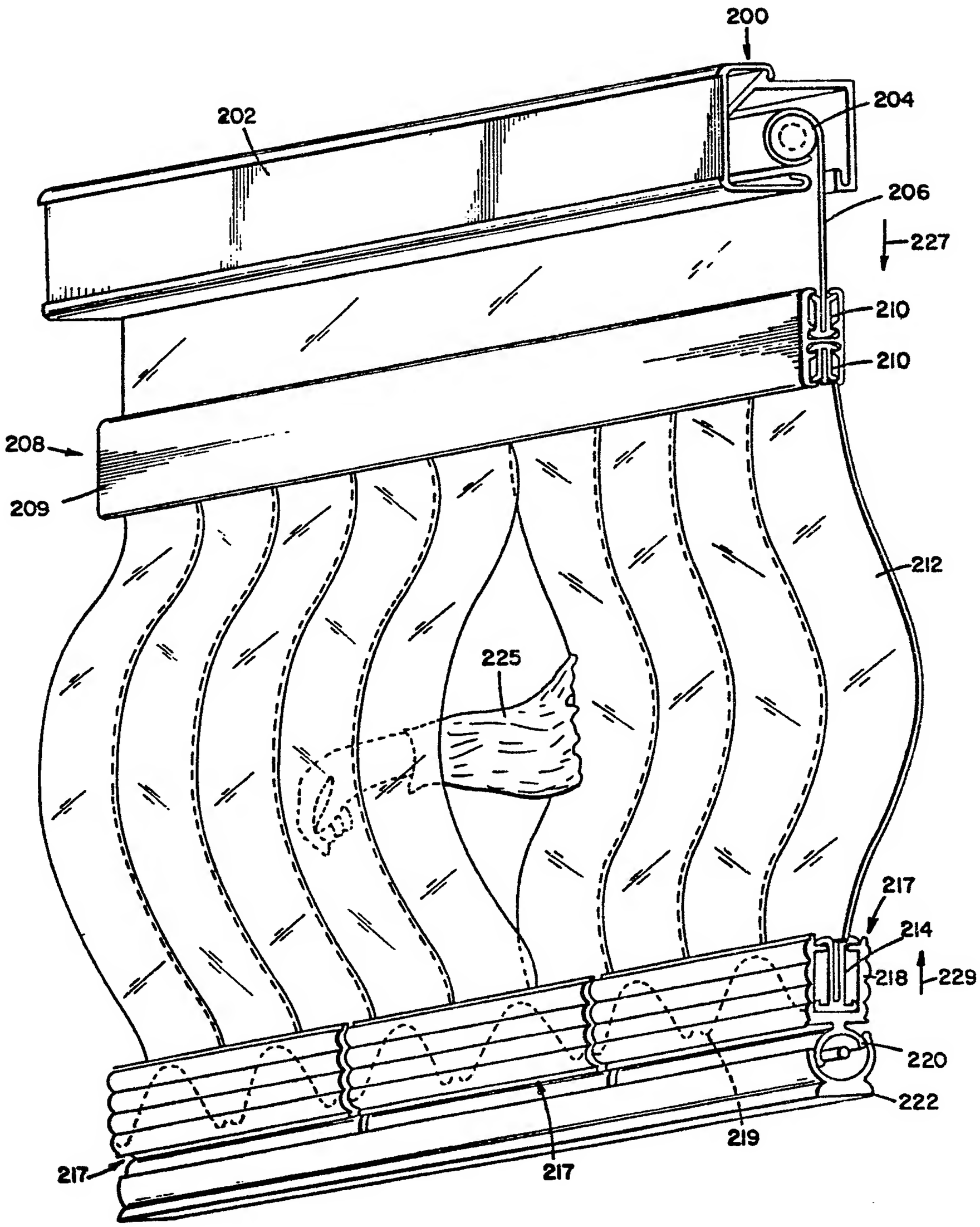
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Fig. 11

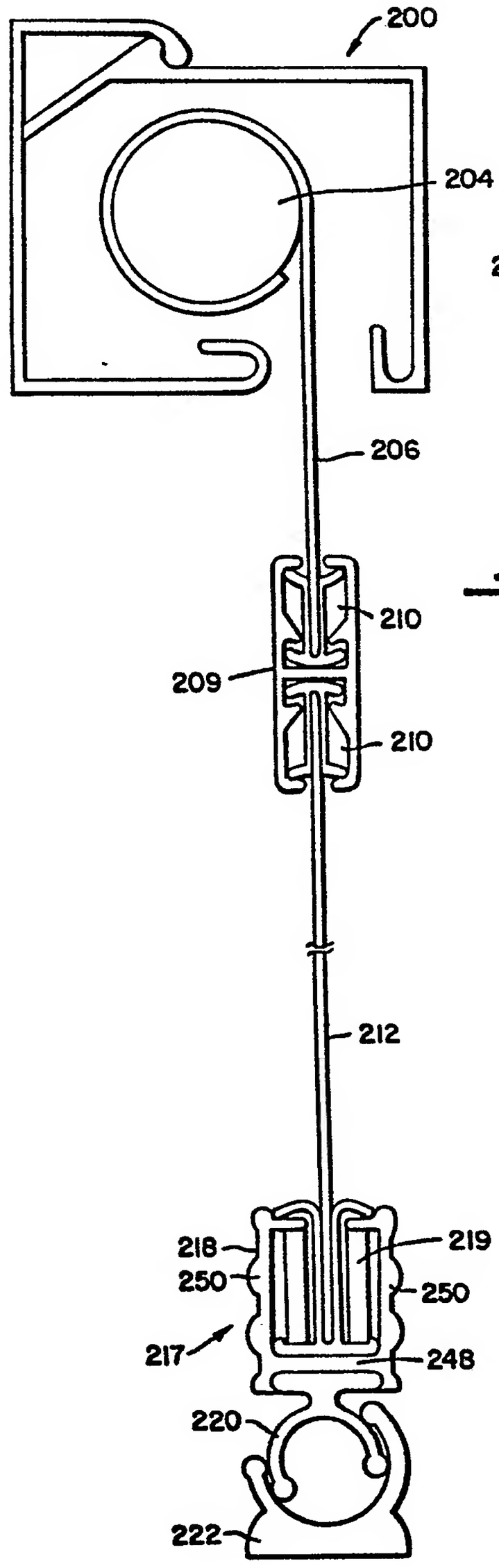


Fig. 12

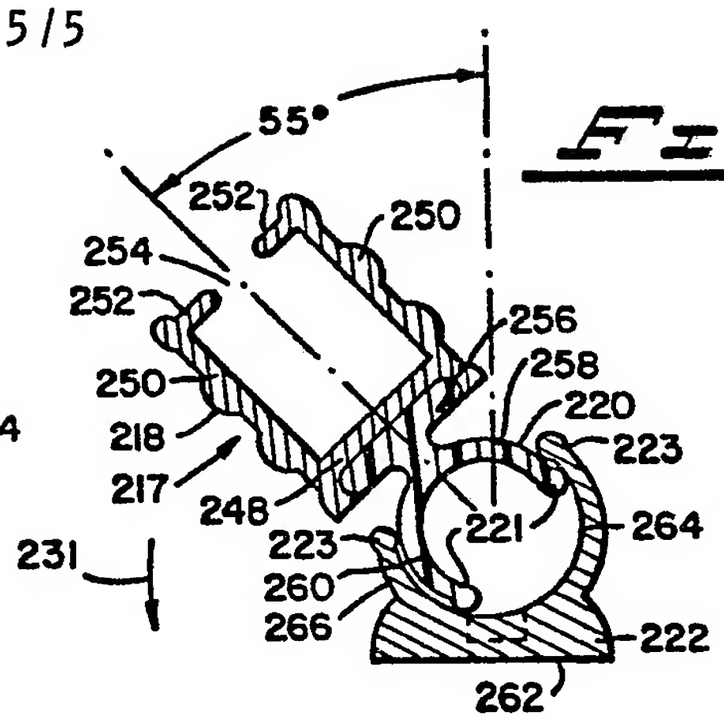


Fig. 14

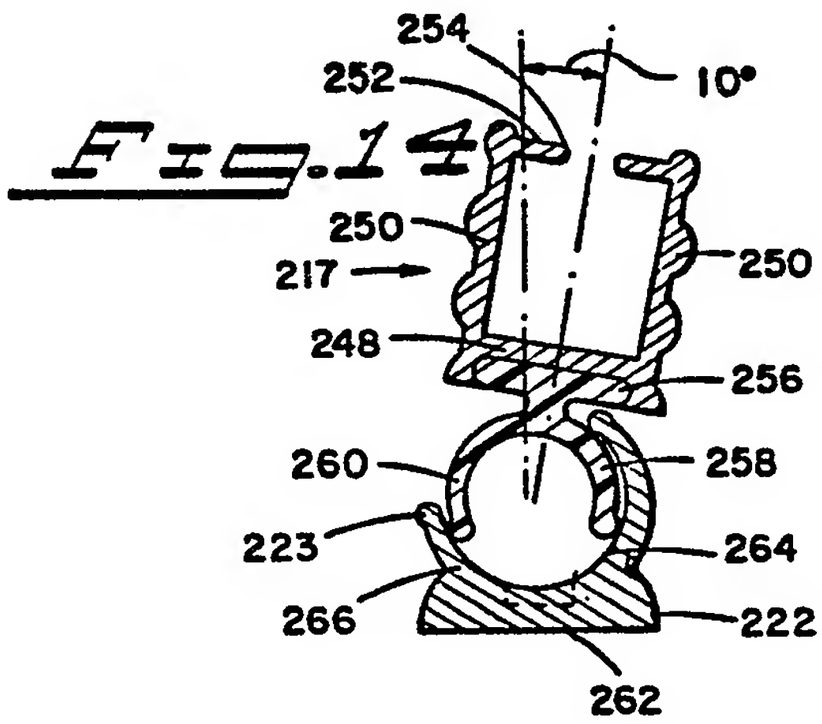
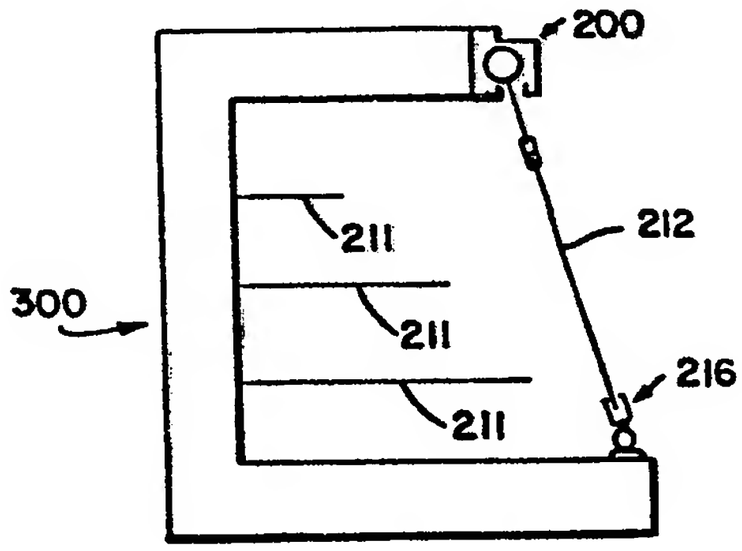


Fig. 13



SPECIFICATION

Refrigerated display case

The present invention related generally to the field of refrigerated display cases, and in particular, to means for temporarily opening and closing apertures of such refrigerator cases and related devices. The invention is also concerned with a shield assembly for thermally isolating an aperture in a refrigerated device while permitting access to the aperture.

Refrigerated display cases in markets have typically used opened units, some having horizontal openings and some having generally vertical openings. Those cases where the refrigerator unit has been provided with a barrier over the access opening, typically uses a sliding or hinged glass door.

The use of glass doors over refrigerated display openings has been limited due to the inconvenience of use, the high expense of installation, and high maintenance cost where the glass is subject to breakage, scratching, requires added electrical to heat the glass, and the like. In many applications, glass doors have provided only limited and restricted access to a portion of the refrigerated case. They can also be difficult to open. What has thus been needed for a long time is a cover assembly for use with refrigerated display cases which is simple, rugged, economical and which provides substantially free access into and out of the refrigerated case by effectively isolating the interior of the case from the ambient environment, with little change in shopping habits and manner.

The present invention is directed to an improvement in this area and has specific applicability in connection with more recently evolved refrigeration units. More specifically, with respect to upright freezer cases, such cases which do not include doors or other types of panels, initially used a "band" of refrigerated air, at approximately −40°F which circulated through the case. The obvious problems with such type of case is that the refrigerated air spilled out over the case into the environment. Moreover, to maintain the air at this low temperature, large compressor units had to be used. The art evolved the use of a second "band" of air in some designs at approximately 20°F which was used to cover the first band. This proved to be a distinct improvement over the prior art in that the second band of air helped retain most of the very cold air within the case, and prevented it from spillage out into the environment.

Recently, some refrigerated cases have been equipped such that an exterior band of ambient air is drawn in by fans from points above the tip of the refrigerated case across the inner bands and then outside of the case adjacent the bottom thereof. In this manner, the colder band(s) of air are blanketed by the band of ambient air. However, while such a freezer case is more efficient than those of the prior art, its efficiency can be substantially increased by the mere mounting of a panel across its front. As discussed above, the use of doors create a number of problems. Moreover, if these newer cases were retrofitted with doors, the exterior band of air would serve no useful purpose and unless removed may even cause severe problems as it cannot escape from the case.

The device of the present invention can be used with such double or triple air band refrigerated cases so as to substantially improve the efficiency, without causing problems such as associated with many prior art devices. It can also be used with cases of substantially different construction and air flow patterns.

The present invention is directed to a novel cover or shield assembly for thermally isolating an aperture in a refrigerated case while permitting access to the aperture. The shield assembly comprises a plurality of resilient, substantially transparent panels each having first and second ends. The panels are arranged and configured in a particular overlaping, side-by-side configuration. A tension bar or rod is disposed along the length of the panels, and selectively retains the panels in a predetermined configuration. Mounting means are disposed adjacent the first end of the panels for mounting the panels to an associated refrigerated case such that the panels extend across the aperture. Finally, maintaining means are disposed adjacent the other end of the panels for selectively maintaining the panels across the aperture. In this manner, while direct access through the aperture into the refrigerated case can be achieved, a substantially better thermal barrier is formed across the aperture so as to preclude the flow of refrigerated air outward from the case.

The invention will now be described further by way of example with reference to the accompanying drawings in which:—

FIGURE 1 is a perspective view showing the shield assembly across a typical refrigerated case;

FIGURE 2 is another perspective view showing the shield assembly in greater detail;

FIGURE 3 is a partial cross-sectional view of the mounting track and rail assembly used to mount the shield assembly to an associated refrigerated case;

FIGURE 4 is another cross-sectional view of the track and rail assembly showing how they can be disengaged;

FIGURE 5 is a cross-sectional view of a panel showing an internally located tension bar;

FIGURE 6 is a perspective view showing a panel assembly, tension bar and various cuff members disposed adjacent each end of the assembly;

FIGURE 7 is a cross-sectional view showing how a panel is retained between the case and an outwardly extending railing assembly;

FIGURE 8 shows another embodiment for retaining a panel in a predetermined position with respect to the case;

FIGURE 9 shows an embodiment wherein the shield assembly is used on a refrigerated case of an alternate construction;

FIGURE 10 illustrates a second embodiment of the

device of the present invention;

FIGURE 11 is an end view of an alternate embodiment of the lower mounting means;

FIGURE 12 is a cross-sectional view of the lower mounting means rotated rearwardly;

FIGURE 13 illustrates a refrigerated display which requires rearward rotation of the lower mounting means;

FIGURE 14 is a cross-sectional view of the lower mounting means rotated forwardly; and

FIGURE 15 is end view of an alternate embodiment of the panels.

The present invention is directed to a shield assembly for thermally isolating an aperture in a refrigerated case from the ambient environment while permitting ready access into and through the aperture. The shield assembly comprises a plurality of resilient, substantially transparent panels, wherein the panels are in an adjacent and overlapping configuration. The panels are specifically mounted on the refrigerated case such that thermal energy flowing across the aperture is prevented from exiting into the ambient environment. However, the panels are also disposed in a manner such that an outward band of ambient air associated with many types of refrigerated cases can pass between the panels and the case and exit adjacent the bottom of the case.

Referring now specifically to FIGURE 1, the shield assembly 10 illustarting a first embodiment of the present invention is generally illustrated. In the preferred embodiment, shield assembly 10 is attached to a first refrigerated case which has a top 14, a bottom 16, and various shelves 18. Such types of cases are found in may food stores. In use, one would reach into opening or aperture 21 and remove various goods such as a package of frozen peas, a salami, milk products or the like. One type of refrigerated case 12 has a first band of refrigerated air generally indicated by arrow 22 which has been cooled to a temperature of approximately −40°F. This super-cold air keeps the food at or below the freezing point and thus preserving freshness. An optional second band of air generally indicated by arrow 24 is maintained at approximately 20°F and serves as a first layer of insulation so as to preclude air band 22 from having direct contact with the environment. Bands 22 and 24 recirculate through case 12. Finally, another band of air generally indicated by arrow 26, at ambient temperature, is drawn in adjacent the top 14 of the case 12 by fans 25, and flows outside of the other bands. This exterior band of air acts as a barrier by controlled air pattern. Because it is not cooled, and acts specifically as a layer of insulation, band 26 flows out of the case 12 across the front 20 as is generally indicated by arrow 26a, it is not recirculated.

Adjacent the top 14 of case 12, various panels of the present invention have been mounted. A typical panel 28 has first end 30 and second end 32. A tensioning bar 34, perhaps best seen in FIGURE 5, is disposed along the length of each of the panels 28 in the preferred embodiment. Such bar 34 is made of a spring-type metal and enables the panels 28 to be maintained a long period of time in a predetermined position. It also causes realignment of panels 28 to their original position after they are moved. However while a bar 34 is preferably used, other types of stiffening and tensioning elements are included within the scope of the present invention. For example, bar 34 could have a variety of cross-sections other than generally rectangular, and could extend only partially down the length of each of the panels 28. As shown in FIGURE 5, panel 28 is preferably made of a first section 28a and second section 28b which have been joined together along their length so as to form a channel 36 through which the bar 34 extends. Panel 28 could also be made with a pocket into which the bar 34 would be inserted.

A mounting means generally indicated by element 38 is attached to the refrigerated case 12 adjacent the front 20 and, along with positioning means 39, are designed to maintain the panels 28 in a predetermined configuration. In the preferred embodiment, mounting means 38 and positioning or maintaining means 39 are designed to maintain the panels 28 such that they are a predetermined distance away from the front 20 of the case 12. In this manner, band of air 26 can flow between panels 28 and the case 12, and not back into the case 12.

Referring now to FIGURES 3 and 4, one can see that mounting means 38 comprises a first member or rail assembly 40 and a second member or mounting track 42. Track 42 has a generally arcuate cross-section and defines an open slot 43 which extends along the length thereof. Rail assembly 40 comprises a rail housing 44 which has a generally rectangular configuration, and an outwardly extending arcuate guide member 46 which extends into is rotatably held by the mounting track 42. Housing 44 has a base 48, various side walls 50 and internally disposed lateral projections 52 defining a gap 54 therebetween. A space 56 is defined in base 48 and is configured so as to engage base 58 of the guide member 46. Opposite the guide member 46 and disposed within housing 44 are spring members 74. Spring member 74 provides tension to the panels 28 as described in greater detail below.

Guide member 46 has a first long arm 60 and second short arm 62, and is specifically designed and configured so as to rotate, as indicated in FIGURE 4, within the track 42 about is longitudinal axis. A protrusion 70 located adjacent each end of each of the arms 60, 62 prevents excessive friction and premature escape of the rail assembly 40 from the track 42. Upon rotation of the rail assembly 40 in track 42, such as indicated by arrow 72, detachment of one element from the other can be achieved.

Referring now to FIGURES 3 and 6, one can see that a joining member or twist lock 78 sandwiches as the oblong bar 34 therebetween. More specifically, a pin 80 extends from one half of twist lock 78, through an opening 82 in the bar 34 so as to engage the other half of the twist lock 78. Twist lock 78 is held within the arcuate configuration of guide member 46 and rigidly secured the rod 34 in position. Optionally or in combination, a pin 81 is extended through housing 44 as shown in FIGURE 3 and joins arms 60, 62 with the arms of the track 42. This enables the panels 28 to be held in a variety of positions. If only pin 81 is

used, bar 34 would extend through a slot 83, or other means to prevent its rotation, and through opening 85 formed in the guide member 46. This enables bar 34 to "float", but still maintains the panels 28 in a selected position.

The panel 28, as shown in FIGURES 3 and 6, and more specifically first end 30, is disposed in a first deep cuff 84 by adhesive and/or by means of a plurality of rivets 76. It should be understood that other means for joining panel 28 to cuff 84 are obviously within the scope of the present invention. The second end 32 of each of the panels 28 is joined to shallow cuff member 94. Deep cuff 84 is comprised of first outwardly extending flanges 86 which engage lateral projections 52, and second outwardly extending flanges 88 are disposed within the rail housing 44 and are held under tension by means of spring 74 against base 48. Thus, pulling down on panel 28 would cause flange 88 to disengage from base 48. Upon release, the panel 28 would return to the original position as shown in FIGURE 3. In this manner stress is transferred from edges of sections 28a and 28b (FIG. 5) into and on springs 74, one (1) such spring 74 is in each channel of cuff 84, if required.

Located adjacent the center of each of the deep cuff members 84 is an opening 90 through which the rod 34 extends. A slot 92 is formed in cuff 84 and the panel 28 extends into slot 92 and is retained therein by means of adhesive and/or rivets 76 as discussed above. In the preferred embodiment, two sections 28a and 28b and thus one panel 28, are held in each cuff 84. Two such cuffs 84 are inserted into each section of housing 44.

Shallow cuff 94, attached to the second end 32 of panel 28, is comprised of first outwardly extending flanges 96 and 98. A slot 99 engages the second end 32 of the panel 28 and holds the panel therein by means of rivets 76 or adhesive such as discussed with respect to the deep flange 84.

Referring now to FIGURE 7, one can see railing assembly 100 which, along with cuff 94 forms one example of positioning means 39 for positoning the panels 28 across the refrigerator case 12. Railing assembly 100 consists of rail member 102 and spacer 104 which separates the rail member 102 from the case 12. Rail member 102 and spacer 104 are held in position by a screw member 106. Of course, other means such as a bolt or the like are within the scope of the present invention.

The operation of the shield assembly 10 of the present invention will now be discussed.

Referring again to FIGURES 1 and 2, a refrigerated display case 12, such as discussed hereinabove which has three bands of air is illustrated. An array 130 of panels 28 are shown to be disposed across the opening or aperture 21 of the case 12. Typically, the panels 28 are substantially transparant, thereby permitting the consumer 110 to freely view the contents of the refrigerated display case 12. The array 130 substantially closes aperture 21 thereby reducing the amount of thermal energy lost across aperture 21 to the ambient environment. When the consumer 110 desires to make a selection and remove an article from the interior of the refrigerated display case 12, it is merely necessary to place the hand through the array 130, and more specifically, through opening 112, and grasp the underlying article. The panels 28 will yield or give way to permit both the consumer's hand to be thrust inward to the interior of the refrigerated case 12 and to permit withdrawal of even bulky articles such as frozen turkeys, without substantial interference.

To accommodate the insertion of the consumer's hand and arm between adjacent panels 28, the uniquely configured mounting means 38 and positioning means 39 (FIG. 1) are utilized. Mounting means 38, comprised of rail assembly 40 and mounting track 42, permits some give in each of the panels 28 as provided for by means of tension spring 74. In addition, guide member 46 can be rotatably disposed within the track 42, and thus some inward and outward movement is also permitted without disengagement if desired. Alternatively, panels 28 can be secured in a fixed position by means of pin 81 or other locking devices, catches or latches. In this embodiment, panels 28 could be positioned such that it abuts against rail member 39 (FIG. 2 or 7). Outward positioning would permit an ambient air band, band 26 to readily flow between the panels 28 and the case 12. As shown in pantom lines in FIGURE 7, panels 28 are prevented from escaping assembly 100 by engagement of flange 98 with arm member 116.

Referring again to FIGURE 7, one can see that cuff 94 can be reversed such that if the panel 28 is pushed toward the interior of the case 12, the possibility that the panel 28 might be completely pushed into the case 12 is prevented by engagement of arm member 114 by flange 98.

After the item is selected and removed, tensioning bar 34 urges panels 28 away from case 12 so as to abut against railing assembly 110.

In a second embodiment shown in FIGURE 8, rather than use a cuff 94, a magnet 118 can be attached along the second end 32 of the panels 28. This magnet 118 would engage a magnet 120 disposed on the railing assembly 100. In this manner, the panels 28 can also be held away from the front 20 of case 12.

Attachment of the shield assembly 10 to case 12 is also relatively simple and straightforward. Mounting track 42 is attached directly to the case 12 as shown in FIGURES 1 and 2 by means for screws, bolts and the like. Because guide member 46 is rotatably joined to track 42, track 42 can be mounted at various angles while still permitting ready attachment with member 46. Railing assembly 100 is likewise easily installed to the case 12 as shown in FIGURE 7. After asembly 100 is attached, panels 28, and more specifically, guide member 46 are inserted into mounting track 42. Stocking of the shelves 18 is not hindered by assembly 10 as the panels 28 can be twisted and removed from the railing assembly 100, and then held off to the side. In addition, the panels 28 can be totally removed by rotation and removal of guide 46 from track 42 as illustrated in FIGURE 4.

The broad concept of the present invention is also clearly applicable to refrigerated cases of alternate design such as freezer case 12a shown in FIGURE 9.

In this embodiment, the case 12a is designed such that air band 26 flows over the front of the case 12a. If one does not want to mount assembly 10 to case 12a by means of railing 100, a separate sub-panel vent assembly 112 can be used. Assembly 122 includes a trough 123 which directs the outer band of air 26 exterior to the case 12a and through vents 128. In this case, panels 28 would be positioned adjacent railing 100 as shown in FIGURE 7.

A second embodiment of the invention will now be presented with reference to FIGURES 10-15. In the second embodiment, the assembly is intended primarily, though not exclusively, for installation across vertically oriented apertures. Referring first to FIGURE 10, there is provided an upper mounting assembly 200 and a lower mounting assembly 216. The upper mounting assembly 200 comprises a housing 202 and an enclosed spring-tensioned roller 204. Wound on roller 204 is a single sheet 206 of a material which may be of the same kind constituting the panels 212. The sheet 206 serves to couple the panels 212 to the roller 204 through a coupling member 208. If one end of each individual panel 212 was attached directly to the roller 204 and permitted to be wound around the roller, the overlapping nature of the panels would result in uneven rolling, producing bulges and wrinkles, and would make the removal and replacement of individually damaged panels difficult. In order to avoid these problems, the individual panels 212 are coupled to the roller 204 by the single sheet 206 through coupling member 208.

Coupling member 208 comprises an outer housing 209 and shallow cuff members 210. The cuff members 210 are designed to be slideably insertable within back-to-back cavities provided in the housing 209. One of these cavities opens vertically upward, the other opens vertically downward. The cuff member fits within the cavity and secures sheet member 206 to one side of the coupling member 208. The shallow cuff member 210 which is retained within the downward opening vertical cavity of coupling member 208 is preferably made in segments, each segment serving to secure one end of a small number of panels to the downward side of the coupling member 208. This allows for removal and replacement of damaged panels in small groups without having to totally detach the coupling member 208 from the lower mounting assembly 216.

Rail assembly 217 comprises a housing 218 and its associated arcuate guide member 220 together with a deep cuff member 214. The coupling member 208 and the rail assembly 217 are coupled together by the individual panels 212. The rail assembly 217 is segmented and together with track member 222 and rod 242 comprises the lower mounting assembly 216. The deep cuff member is also preferably segmented in a manner similar to the segmentation of the shallow cuff member 210 which fits in the downward opening cavity of coupling member 208. The deep cuff member 214 is suitably retained within a housing 218 which is part of the rail assembly 217. Both the guide member 220 and track member 222 are arcuate members with the outside diameter of the guide member being slightly less than the inside diameter of the track member such that the rail assembly 217 has a certain limited freedom to rotate about the longitudinal axis of the track member 222. The utility of this feature will be explained below.

Spring members 219 are retained between an upwardly facing surface of deep cuff member 214 and a downwardly facing surface of housing member 218. The reference to upward facing and downward facing is made with respect to the typical installation of the embodiment of FIGURE 10 upon a vertically oriented aperture. The springs 219 thus tend to retain the deep cuff member 214 in contact with the base of the housing member 218 while at the same time allowing flexibility in the actual location of cuff member 214 within housing 218. This flexibility of position permits the lower mounting assembly 216 to compensate for slight misalignments in the panels 212 and misalignments between the upper mounting assembly 200 and the lower mounting assembly 216 which should preferably be parallel. Without this flexibility the panels would not remain in their slightly overlapping and touching position since vertical tension across the cuff member 214 would be uneven.

In order to reach merchandise stored behind the panels, a person would thrust his arm 225 between adjacent panels 212 and grasp the item of merchandise. To accommodate the insertion of the arm 225 between adjacent panels coupling member 208 is drawn toward the arm (in the direction of arrow 227) and sheet member 206 unrolls slightly from the spring-tensioned roller member 204. Because the coupling member 208 is drawn toward the deep cuff member 214 as any two adjacent panels are parted, the distance between the opposing ends of each panel is decreased thereby removing tension from all but the two parted panels. Thus, even if the item being passed through the panels is large and the two panels are parted to an extent that they encounter and part additional panels, the additional panels are not under tension and no increase in force is required to part the additional panels. The spring-tensioned roller 204 and the spring-loaded deep cuff member 214 in combination with the natural resiliency of the panels 212 thus allows a person to withdraw an item of merchandise through the panels 212 much more easily and of considerably larger size then would be possible if the opposing ends of the individual panels were rigidly affixed to the sides of the aperture.

As shown in FIGURE 10 the panels 212 are, in the preferred embodiment, mounted in groups of three. One end of a group of three panels is mounted in a shallow cuff member 210 and slidingly inserted into the downward facing cavity of coupling member 208. The other end of the same three panel members are inserted into the deep cuff member 214 which itself is inserted into the housing 218 of a rail assembly 217. The rail assembly 217 is then fitted into the track member 222. The panels 212 are mounted in groups of three panels per cuff in order to facilitate easy removal of and replacement of a damaged panel without the requirement to totally detach the coupling member 208 from the lower mounting assembly 216. The manner of fitting the rail assem-

bly 217 into the track member 22 is explained below.

FIGURE 11 shows an end-on view illustrating a slightly different construction of the rail assembly 217. In FIGURE 11 the rail assembly 217 is comprised of a housing member 218 having sidewalls 250 and comprised of an attached guide member 220 which is somewhat arcuately-shaped. Both the housing member and the guide member are described in more detail below. This construction should be compared with the construction shown in FIGURE 10 where the rail assembly was of unitary construction.

The rail and track assemblies are shown in greater detail in FIGURE 12. The rail assembly 217 comprises a housing 218 and a guide member 220. The housing member 218 has a base portion 248 and is provided with two opposing sidewalls 250 extending perpendicularly upward from the base. At the top of each of the sidewalls 250 and projecting inwardly toward one another are located lateral projections 252. The space between the ends of the lateral projections 252 define a gap 254 which extends longitudinally the full length of the housing member 218. The base 248 of the housing member 218 is provided with a recess which is designed to accept the base 256 of the guide member 220. The guide member is provided with a first arm 258 and a second arm 260 which together define an arcuate section. The outside diameter of this arcuate section is slightly smaller than the inside diameter of the corresponding arcuate section provided on the track member 222. The track member comprises a base 262 and a first arm 264 and second arm 266 which combine to form an arcuate section complementary to the arcuate section of the guide member 220. The guide member 220, as illustrated in FIGURE 12, is preferably constructed of a somewhat rigid nylon. As can be seen from an examination of FIGURE 12, the rail assembly 217 is free to rock back and forth about the longitudinal axis of the track member 222.

The range of angular displacement of the rail assembly 217 within the track member 222 is determined by the length of the arcuate arms 264 and 266 of the track member 222 and the length of the arcuate arms 258 and 260 of guide member 222, as well as the relative position of the guide member within the track, i.e., whether the guide member is in its normal position or "reversed" position. For a clear understanding of this explanation, reference should be made to FIGURES 12 and 14. In the present embodiment, it is preferred that one of the two arcuate arms of both the guide member and the track member be longer than the other. As shown in FIGURES 12 and 14 the guide member has a long arm 260 and a short arm 258. Track member 222 has a long arm 264 and a short arm 266. As shown, the long arm 260 of the guide member is adjacent the short arm 266 of the track member. This allows angular rotation of the rail assembly within a range of 10° from vertical on one side (FIGURE 14) to 55° from vertical on the other side (FIGURE 12). If the guide member is now removed and reinstalled in track member 222 such that its long arm 260 is adjacent the long arm 264 of the track member the range of angular rotation is changed. The rail assembly will then be able to rotate in the range from 25° on the same side of vertical as shown in FIGURE 12, all the way downward to 85° from vertical on the same side. By changing the position of track member 222 so that the long arm 264 is located on the left hand side (as referenced to FIGURES 12 and 14) and appropriately positioning the long and short arms of the guide member similar ranges of rotation will occur toward the right hand portion of FIGURE 12. Thus, by proper positioning, the rail assembly can be made to rotate within a range of 85° from vertical on one side to 85° from vertical on the other side. As shown in FIGURE 12, the rail assembly 217 must be rotated in the direction of arrow 231, i.e., against the normal tension in panels 212 to remove the rail assembly from the track. This broad latitude enables the mounting assembly of FIGURES 12 and 14 to accomodate refrigerated units 300 such as shown in FIGURE 13, i.e., the shield may be required to accomodate a recessed or an overhanging refrigerated unit. The relative position of the track member and guide member is preferably chosen such that in normal use the angular displacement of the guide member will not approach the maximum possible. Displacement to the maximum is only intentionally performed when it is desired to detach the rail assembly 217 from the track member 222 for the purposes of restocking the refrigerated units or for replacing a damaged panel.

A shown in FIGURE 12 the arms 258 and 260 of the guide member, and arms 264 and 266 of the track member are provided at their free ends with a bead. The bead provided on the guide member is designated as 221 and the bead provided on the track member is designated as 223. The sizing of the guide member and track member is such that when the rail assembly 217 is at its maximum angular displacement it can be easily snapped out of the track member 222. If the rail assembly 217 is not at its maximum angular displacement it is much more difficult and becomes progressively more difficult to snap the guide member out of the track member as the displacement of the rail assembly 217 leaves the maximum.

Although the rail assembly 217 is designed to be easily snapped out of the track member 222 when the rail assembly is at its maximum angular displacement it is undesirable for it to be too easily snapped free of the track member. This could occur by accident if a shopper or a child was to lean on the rail assembly 217 causing it to rotate. To help guard against such accidental uncoupling of the guide member and track member, the track member 222 may be provided with a rod and a locking bushing which helps to retain the rail assembly 217 within the track member even when the rail assembly is at its maximum angular displacement.

While the panels 212 referred to herein have been described generally as transparent rectangular panels it is contemplated that the cross-section of the panel may appear as shown in FIGURE 15. Along each edge of the panel would be provided a bead 340 which would be somewhat oblong in cross-section and would extend both above and below the plane of the panel 212. This configuration of the panel 212 would be particularly appropriate where

the panels are overlapping, i.e., where adjacent panels are overlapped at one end such that a first panel is beneath a second panel. This would create a sort of snaking or twisted overlapping. When the panels are overlapped in this fashion their tendency to adhere to one another is greatly reduced by the use of the beads 340 shown in FIGURE 15.

Although the present invention has been described in connection with the particular embodiments shown and discussed hereinabove, it is to be expressly understood that many other alterations and modifications may be made by those having ordinary skill in the art without departing from the spirit and scope of the present invention. For example, with respect to the first embodiment a wide variety of means can be used so as to properly place the panels 28 across the aperture 21 such that they maintain a predetermined distance away from the case 12. It has been found that even without internal stiffening elements 34 alone, in some embodiments proper placement can be achieved. Thus, in some situations stiffening element 34 can be removed and a magnet or other means, such as discussed with reference to FIGURE 8, utilized.

It is respectfully submitted that what has been described hereinabove is a unique apparatus for reducing the power consumptions primarily, but not limited, to supermarket refrigerated display case. It is expected that the present invention will extend the life of refrigeration equipment, such as motors, generators and compressors, as well as decreasing maintenance required on the same. Refrigeration units, incorporating t .he present invention's design, may also be built with smaller refrigeration capacities and therefore may be built in a more economical manner. In addition, advantages can be obtained with respect to space, air conditioning and heating in markets employing a large number of open display refrigerator devices. In addition, with the more uniformly maintained temperature within the refrigerated cases, which the present invention will allow, it is also expected that the shelf-life of refrigerated food stuffs may be extended. The degree of consumer comfort will also be increased in the proximity of such modified refrigerated cases because the ambient air will no longer turn the supermarket into a "mini-freezer". This invention is thus susceptible to a wide variety of beneficial uses.

CLAIMS

1. A shield assembly for thermally isolating an aperture in a refrigerated device while permitting access to the aperture, comprising:

(a) a plurality of resilient, substantially transparent panels each having first and second ends, said panels arranged in a partially overlapping, side-by-side configuration;

(b) means disposed along the length of said panels, for stiffening and selectively retaining said panels in a predetermined pattern;

(c) mounting means disposed adjacent said first end of said panels for mounting said panels to said refrigerated device such that said panels extend across said aperture; and

(d) means, disposed adjacent said second end of said panels, for maintaining said panels across said aperture.

2. A shield assembly according to Claim 1 wherein said stiffening means comprises an elongated member which extends from a first position adjacent said first end of said panels to a second position adjacent said second end of said panels.

3. A shield assembly according to Claim 2 wherein said stiffening member is a generally flat piece of flexible metal.

4. A shield assembly according to Claim 2 wherein said stiffening member is an elongated metal bar.

5. A shield assembly according to Claim 1 wherein said mounting means comprises a rail assembly having a guide member and a track defining an elongated slot for engaging said guide member.

6. A shield assembly according to Claim 5 wherein said rail assembly comprises a housing defining an opening along one side thereof and a spring member is disposed in said housing; and further wherein

a cuff member having first and second flanges is attached to said first ends of said panels, said cuff member being disposed in said opening such that said first flange projects through said opening, and said spring member urges said second flange away from said opening.

7. A shield assembly according to Claim 1 wherein said mounting means comprises:

a track member of generally arcuate cross3section having a slot extending longitudinally along said track member; and

a rail assembly provided with an arcuate guide member for coupling said rail assembly to said track hember, said slot spanning an arc sufficient to permit said arcuate guide member to pass therethrough, whereby said rail assembly is coupled to said track member so as to permit said rail assembly to rotate a limited extent about the longitudinal axis of said track member.

8. A shield assembly according to Claim 1 wherein said maintaining means comprises an elongated railing assembly configured to selectively engage said second end of said panels.

9. A shield assembly according to Claim 8 wherein said maintaining means further comprises means for maintaining said railing assembly a predetermined distance from said refrigerated device, adjacent said aperture.

10. A shield assembly according to Claim 8 wherein said railing assembly includes a first arm member for selectively engaging said panels adjacent said second end thereof.

11. A shield assembly according to Claim 5 wherein said mounting means further includes means for retaining said guide member in a predetermined position, selectively engaging said panels adjacent said second end thereof.

12. A shield assembly according to Claim 1 wherein said stiffening means is disposed in each said panel.

13. A shield assembly according to Claim 1 wherein each said panel comprises first and second sections joined together along the length thereof,

and said stiffening means is disposed along the length of the joint.

14. A shield assembly for thermally isolating an aperture in a refrigerated device while permitting access to the aperture, comprising:

(a) a plurality of resilient, substantially transparent panels each having first and second ends, said panels arranged in a partially overlapping, side-by-side configuration;

(b) an elongated stiffening member disposed in each said panel; and

(c) mounting means joined to each said panel adjacent said first end thereof for joining said panels to said refrigerated device and for retaining said stiffening member such that said panels extend across said aperture and are urged to retain a predetermined configuration, said mounting means including a first member joined to said first end of said panel, and a second member for joining to said refrigerated device.

15. A shield assembly according to Claim 14 wherein said first member of said mounting means comprises a rail assembly having a guide member, and said second member of said mounting means comprises a track defining an elongated slot for selectively engaging said guide member.

16. A shield assembly according to Claim 14 further including an elongated railing assembly configured to selectively engage said panels adjacent said second end thereof.

17. A shield assembly according to Claim 16 wherein said mounting means includes means for fixedly joining said stiffening member thereto.

18. In a refrigerated device having an aperture, the improvement comprising a shield assembly joined to said device for substantially isolating said aperture while permitting access, said shield assembly having a plurality of resilient panels extending from a first end of said aperture to a second end thereof, an elongated stiffening member disposed in each said panels for selectively retaining said panel in a predetermined position, means for joining one end of said panels adjacent said first end of said refrigerated device, and means, disposed adjacent said second end of said aperture, for maintaining said panels in said predetermined position.

19. A refrigerated device according to Claim 18 wherein said maintaining means comprises a railing assembly configured to maintain said panels a predetermined distance from said refrigerated device.

20. A refrigerated device according to Claim 18 or 19 wherein said joining means comprises a rail assembly joined to said panels and a track joined to said refrigerated device, said rail assembly being selectively movable in said track.

21. A refrigerated device according to Claim 18 wherein said joining means comprises:

a track member of generally arcuate cross-section having a slot extending longitudinally along said track member; and

a rail assembly provided with an arcuate guide member, for coupling said rail assembly to said track member, said slot spanning an arc sufficient to permit said arcuate guide member to pass therethrough whereby said rail assembly is coupled to said track member so as to permit said rail assembly to rotate a limited extent about the longitudinal axis of said track member.

22. A refrigerated device according to Claim 18 further including a vent assembly disposed adjacent said refrigerated device, and wherein said maintaining means is joined to said vent assembly.

23. In a refrigerated device having an aperture, the improvement comprising a shield assembly for isolating said aperture while permitting access through said aperture, said shield assembly comprising:

a plurality of resilient, substantially transparent panels having first and second ends;

means joined to said refrigerated device for disposing said panels across said aperture and tensioning each of said panels;

means for urging said panels into a predetermined position adjacent said aperture;

means disposed adjacent said second end of said panels, for maintaining said panels in said predetermined position, said maintaining means including a realing joined to said refrigerated device; and wherein

said refrigerated device includes means for directing air between said panels and said aperture.

24. A refrigerated device according to Claim 23 wherein said refrigerated device includes vent means located adjacent said second end of said panels for directing said air from between said panels and said aperture to a location external of said refrigerated device.

25. A refrigerated device according to Claim 23 or 24 wherein urging means comprises an elongated stiffening element.

26. A shield assembly for thermally isolating an aperture in a refrigerated device from the ambient environment while permitting access through said aperture, comprising:

a plurality of resilient and substantially transparent panels having first and second ends;

means for disposing said panels across said aperture and tensioning each of said panels;

means for coupling said first end of said panels to said means for disposing and tensioning; and

means for securing said second end of said panels along a side of said aperture, said means for securing comprising a rail assembly joined to said second end of said panels and means for engaging said rail assembly, said engaging means having a longitudinal axis permitting said rail assembly to rotate therein about said longitudinal axis.

27. A shield assembly according to Claim 26 wherein said rail assembly has a guide member and said engaging means includes a track member defining an elongated slot for selectively engaging said guide member.

28. A shield assembly according to Claim 26 wherein said means for coupling said first end of said panels to said means for disposing and tensioning comprises:

first and second interconnected cuff members, said first cuff member joined to said panels and said second cuff member joined to said means for disposing and tensioning.

29. A shield assembly according to Claim 27 wherein said guide member has a generally arcuate cross-section and said slot is configured such that said rail assembly is rotatably in said track member through a predetermined arc.

30. A shield assembly according to Claim 26 wherein said rail assembly comprises:

a housing portion defining a longitudinal opening extending along one side thereof;

a cuff member having a base flange joined to two end flanges, said cuff member being disposed in said chamber such that said two end flanges project through said longitudinal opening; and

a spring member disposed in said housing and urging said base flange away from said opening;

whereby said panels are resiliently retained between said securing means and said means for disposing and tensioning.

31. A shield assembly according to Claim 26 wherein said means for disposing said plurality of panels across said aperture and tensioning said panels comprises:

a track member of generally arcuate cross-section having a slot extending longitudinally along said track member; and

at least one rail assembly provided with an arcuate guide member for coupling said at least one rail assembly to said track member, said slot spanning an arc sufficient to permit said arcuate guide member to pass therethrough whereby said rail assembly is coupled to said track member so as to permit said rail assembly to rotate a limited extent about the longitudinal axis of said track member.

32. A shield assembly according to Claim 26 wherein each panel is provided with a bead along its longer sides, said bead extending outwardly on both sides of the plane of said panels.

33. A shield assembly for thermally isolating an aperature in a refrigerated device while permitting access to the aperture substantially as herein described with reference to and as illustrated in the accompanying drawings.

34. A refrigerated device having an aperture substantially as herein described with reference to and as illustrated in the accompanying drawings.

35. In a refrigerated device having an aperture, the improvement of a shield assembly for isolating said aperture while permitting access through said aperaure substantially as herein described with reference to and as illustrated in the accompanying drawings.

36. A shield assembly for thermally isolating an aperture in a refrigerated device from the ambient environment while permitting access through said aperture substantially as herein described with reference to and as illustrated in the accompanying drawings.

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INVENTOR-INFORMATION:

NAME	COUNTRY
SCHENKER, MORTIMER ALLANw?w?	US

ASSIGNEE-INFORMATION:

NAME	COUNTRY
SCHENKER MORTIMER ALLAN	N/A

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ABSTRACT:

CHG DATE=19990617 STATUS=O> Energy losses from refrigerated display cases, which are normally open, can be reduced by the use of the shield assembly (10). The shield assembly comprises a plurality of transparent and resilient panels (28), each panel being adjacent to at least one another and having an overlapping relationship with the adjacent panel. The panels are mounted in a rigid frame and allow access therethrough by stretching and bending one or more of the panels along the overlap. The plurality of panels are fitted in a specifically configured mounting means (38) such that they are held in place across an opening of the display case. Retaining means (39) are disposed adjacent the other end of the

panels to keep the shield assembly in proper position. □